NC Sport Fish Restoration Final Report

State: North Carolina **Grant Number:** F-25, Segments 20-24

Grant Title: North Carolina Artificial Reef Development

Grant Award Period: January 1, 2005 – December 31, 2009

Project Costs:

	Budgeted	Expenditures
Federal	$864,705	$669,274.95
State	$288,238	$262,992.60
TOTAL	$1,152,943	$932,267.55

Grant Objective: Coordinate construction and conduct maintenance activities to provide a network of readily accessible artificial reefs in North Carolina's marine waters.

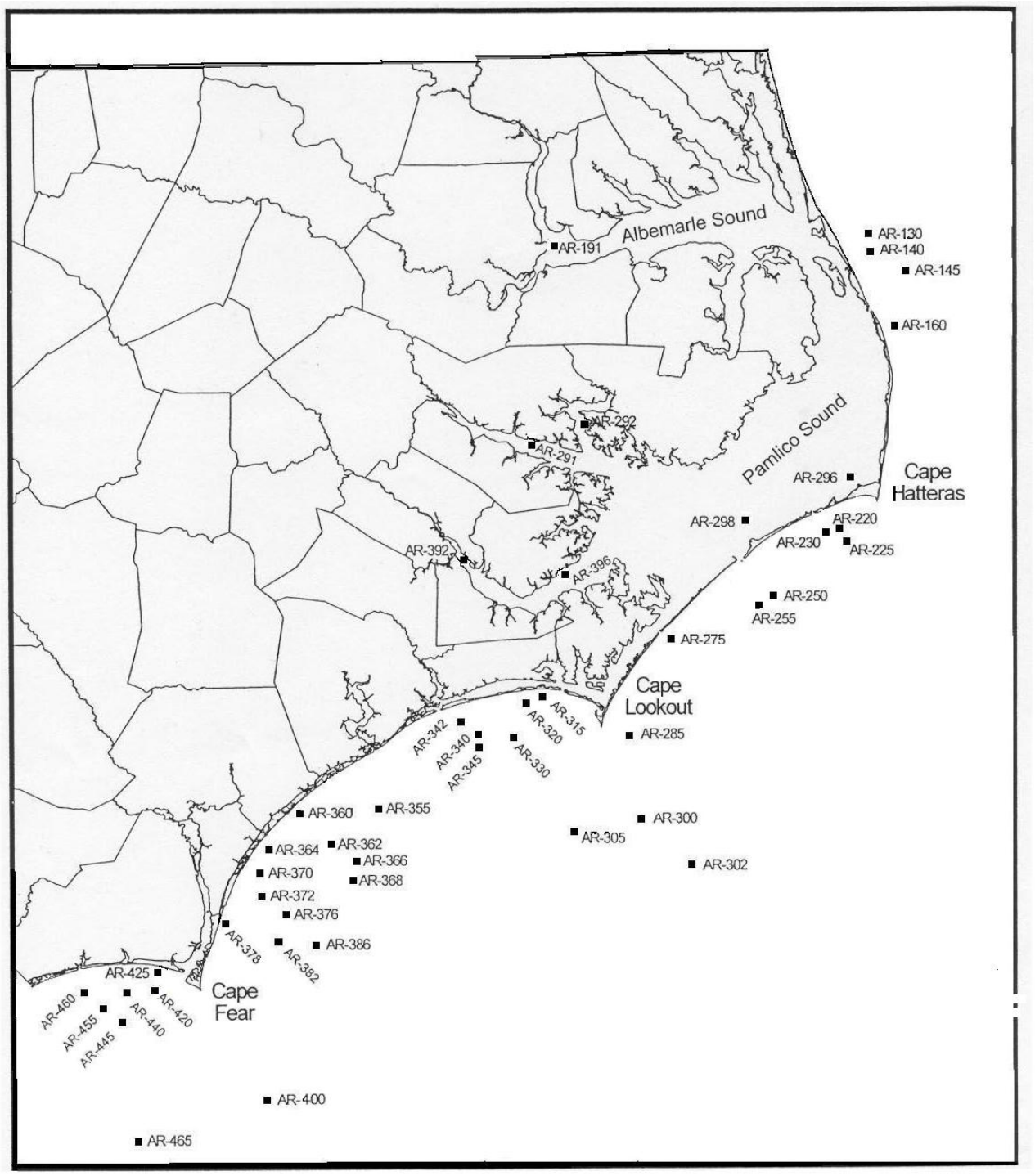
PROJECT I: ARTIFICIAL REEF ACCESS

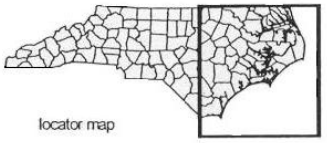
Objective: To provide access to coastal artificial reefs and meet USCG requirements marking artificial reef sites.

Activities Proposed: A DMF 135 ft. LCU class vessel and a DMF 63 ft self propelled barge will devote approximately 18 sea days annually combined to artificial reef buoy rotation, replacement and maintenance. The thirty-five ocean buoys (1 per reef site) and twenty-five estuarine buoys (1-4 buoys per site) will be serviced with Gilman foam buoys (Figure 1). Buoys need annual replacement with new or reconditioned buoys. Buoys that are rotated out of service will be cleaned by suitable means to remove marine growth, hardware tightened, reflective tape replaced, antifouling paint applied as necessary, and renumbered. After being cleaned and repaired, the buoys will be stored until they are deployed during the next annual rotation. Buoys will also be replaced in the event of loss between scheduled service intervals.

The NCDMF will purchase the necessary buoys, chain, swivels, and shackles, and produce concrete anchors to service the ocean and estuarine buoy systems. The DMF purchases buoys and associated materials annually to maintain a buoy inventory for successful rotation of ocean and estuarine buoys.

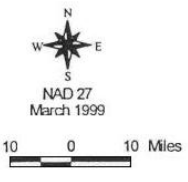
In conjunction with other diving activities, inspection dives will be conducted to establish buoy system performance between scheduled rotations.





ARTIFICIAL REEFS of NORTH CAROLINA

Figure 1



Final Project Summary:

Buoy Operations

Buoys were serviced from January to April and September to December of every year during the grant award period. By the end of 2008, all ocean buoys needed for the servicing buoy run had been purchased. By the end of 2009, the only ocean buoys that need to be purchased are to replace lost buoys. Some 4th and 5th class estuarine buoys need to be purchased to have a full number of operational and replacement buoys. Buoys are occasionally lost because of the difficultly in acquiring predictable and regular vessel time. The usual cause of buoy loss is from worn buoy chain where contact is made with the bottom. The buoy chain should be inspected and serviced every 12 to 18 months.

During the grant award period there has been an increase in the amount of time vessels are needed by other DMF programs, sometimes consequently requiring a shift in artificial reef project activities. Buoys maintenance is mandated however, and vessel needs are a priority over development activities.

The buoy program is streamlined, and with the addition of a deck winch for the 135 ft vessel West Bay, the process is safer. The 54 ft vessel Shell Point is now being used for the servicing of 5th and 4th class buoys on the seven estuarine reef sites. With these vessels and a full inventory of buoys, chain and associated hardware, the buoy operations are becoming more routine.

The most significant finding in the buoy program is that on four estuarine reefs, Oriental, Ocracoke, Buxton and Black Walnut Point, the larger 4th class buoy is necessary. The 4th class buoy is rated for exposed waters and the 5th class is rated for semi-exposed waters. Though these sites are somewhat near shore they each have exposed wind quadrants that necessitate the larger 4th class buoy. Currently, the river reef sites of New Bern, Bay View and Pungo River will be serviced with 5th class buoys.

Buoy Maintenance and Repair

In year 2006 anti-fouling paint was applied to the estuarine buoys. In 2007 two ocean buoys had anti-fouling paint applied and by 2008 all buoys received anti-fouling paint. This additional step in buoy preparation is worth the extra cost and time. The paint helps the buoys, by reducing drag, and the strain on the chain caused by the drag. The buoys have a sharper appearance as well. The greatest benefit is that less high pressure washing is required and thus less abrasion caused by the cleaning.

Sand blasting and painting the shackles, swivels, and metal components is performed now to extend the life of buoy components. The resource of donated chain is diminishing with the increases in scrap steel prices; therefore, chain purchases will be a frequent occurrence in future years.

Over the last five years the Gilman spar buoys used in the ocean have been exceptional. Providing that they are serviced regularly by changing the buoy, replacing the ware area chain and replacing all hardware the system is effective. These are a one of a kind design developed by NCDMF and Gilman Buoys. NCDMF is able to replace parts that wear out to maintain serviceability. Each year a buoy is in service, the annual cost of maintaining a buoy on reef site is reduced.

Specific accomplishments for each of the last five years of the buoy operations and maintenance program are detailed below:

- **2005:** Six (6) absent buoys were replaced and sixteen (16) buoys were rotated into service. Nine (9) buoys remained in service throughout the period. Total buoys remaining in service, replaced, or rotated into service during the period is thirty-one (31). Buoys washed ashore were recovered from area beaches. Ten (10) buoys, five (5) ocean spar and seventeen (17) 5th class estuarine buoys were purchased. Additionally, eleven (11) ocean spar buys were purchased with State funding to bolster the buoy inventory. Twelve (12) buoy anchors were fabricated and shackles were purchased. Chain was purchased and/or scavenged to support buoy needs.

  Four (4) ocean reefs (buoys) were not rotated into service because of lack of inventory. No estuarine reefs were buoyed in 2005. Existing buoys remained on site for four (4) of the seven (7) reef locations. Availability of the deployment vessel R/V West Bay for buoy operations was limited. This was due to the need to deploy reef materials that were located on land that was time sensitive, the time share of the vessel with the Oyster Sanctuary program and coupled with an extended downtime of the vessel after leaving shipyard repair. Buoys were assessed for durability and service was performed on those buoys that were lost or damaged.

  Seven (7) buoys rotated out of service were reconditioned for future service. One estuarine reef required onsite servicing of its buoys. One (1) buoy was inspected through diving activities. Fewer buoys were removed from service for cleaning due to a mandatory restriction on fuel use during September and October.

- **2006:** Four (4) absent buoys were replaced and nineteen (19) ocean buoys were rotated into service. After the ocean buoy work was completed in March all ocean buoys remained on station during the remainder of the reporting period. The new 12 ft buoy design was installed on all 35 ocean reefs requiring buoys as of March 15. Buoys were removed on one estuarine reef. No estuarine reefs had new buoys added during the segment because equipment necessary onboard the 63 ft. self-propelled barge was non-operational.

  Ten (10) buoys were rotated out of service and reconditioned for future service. Anti-fouling primer and paint was purchased for the estuarine and ocean buoys. Replacement reflective tape was purchased during this segment. An inspection dive was performed on one ocean buoy. Estuarine buoys removed were not reconditioned due to having exceeded their useful lifespan.

- **2007:** One (1) absent ocean buoy was replaced due to manufacture defect. A portion of this buoy (AR-330) found off Carteret County was recovered and the manufacturer replaced missing portions without charge. This lost buoy was replaced during material deployment operations occurring on a near reef. With the exception of the AR-330 buoy and one other that was reported adrift on November 29 (AR-320), all ocean buoys remained on site throughout the year. While the time on station for the ocean buoys far exceeds the desired time between rotations, it is a testament to the durability of the new buoys system.

A full set of four buoys 5th class was placed in service for three estuarine reef sites that had old style inshore buoys missing and one reef site had new 5th class buoys rotated into service. The latter site had old (6 ft x 20 in.) ocean buoys pulled from service. During the reporting period year, ten (10) ocean spar buoys, four (4) 5th class and four (4) 4th class buoys were purchased. The Division purchased with State funds fifteen (15) 3rd class swivels and forty-five (45) 3rd class shackles to support upcoming buoy service needs.

Anti-fouling primer and paint was applied to seventeen (17) new 5th class estuarine buoys and two used ocean buoys. An inspection dive was performed on one ocean buoy finding chain near the bottom excessively worn. Ocean reefs were not serviced this period.

- **2008:** Five (5) ocean buoys were replaced during deployment operations in 2008. These were the only buoys serviced in 2008. A full buoy service was scheduled for spring 2009 due to the availability of the buoy service vessel.

  Buoys that were out of service were cleaned and reconditioned for service. Inspection dives of the Atlantic Beach Reef (AR-315) buoy noted that chain in the wear area was severely degraded and needed immediate action. Additional chain was added to the wear area during commercial diving operations in June to increase chain durability and allow additional time until a comprehensive buoy replacement could occur.

  Availability of the deployment vessel R/V West Bay for buoy operations was limited. This was due to the need to deploy reef materials that were located on land that was time sensitive, the time share of the vessel with the Oyster Sanctuary program, and coupled with an extended downtime of the vessel after leaving shipyard repair. Buoys were assessed for durability and service was performed on those buoys that were lost or damaged.

- **2009:** Thirty (30) ocean buoys were replaced. One estuarine reef buoy set (4 buoys) was replaced. No buoys were purchased this year. All buoys (30) required for buoy servicing were cleaned, repaired and painted with anti-fouling paint.

PROJECT II: ARTIFICIAL REEF COORDINATION

Objective: To promote and coordinate construction of artificial reefs in coastal North Carolina.

Activities Proposed: The Artificial Reef Coordinator will work with the various agencies involved in the permit process in order to maintain an efficient permitting procedure. The Reef Coordinator will utilize the North Carolina Artificial Reef Master Plan to plan, site, construct, buoy, and monitor the artificial reefs of coastal North Carolina. Information on construction materials and methods along with material and site locations will be disseminated. Communication with state fishing and diving interest and the general public will be provided regarding reef location and materials.

Final Project Summary: During the grant award period, the Artificial Reef Coordinator continued all planning, permitting, construction, and monitoring activities for to North Carolina artificial reefs. Communication continued with the United States Coast Guard, US Army Corp of Engineers, and the National Ocean Service to maintain efficient permitting processes. The North Carolina Artificial Reef Master Plan and the Atlantic States Marine Fisheries Commission,

Guidelines for Artificial Reef Materials, second ed. document was consulted frequently in the process of planning.

Utilizing the NC DMF web page and multi-media presentations, the Artificial Reef Coordinator also disseminated artificial reef information to the public and maintained communication with other State's reef programs during the grant award period. Communication with state fishing and diving interest and the general public was provided regarding the artificial reef program. Awareness is critical to maximize public participation in using the artificial reef system and presentations are the best ways to familiarize the public to the program. During the grant award period, the artificial reef program made 29 presentations to fishing and diving clubs, civic organizations and government groups, such as the Piedmont Offshore Club (Greensboro), Carteret County Sportfishing Association (Beaufort), ASMFC Artificial Reef Committee (Panama City, FL), Pirate's Cove Fishing School (Manteo), Aquatic Safari Dive Club (Wilmington) and the Goldsboro Sail & Power Squadron (Goldsboro). These presentations made personal contact with 1,091 people. In 2006, artificial reef program staff came in contact with 822 persons at Seas SCUBA Expo in Durham, NC.

During the grant award period, major changes in coordination activities relative to interest in reef development activities have occurred. With the economic circumstances, the emphasis in artificial reef coordination is now focused around the estuarine reefs. These reefs have been in existence since the early 1980's but have received little if any attention since their initial construction. These reefs need enhancement for recreational fishing interest and a greater emphasis is being placed on them to create habitat for finfish species of critical concern. Subsequent grant awards are likely to see greater emphasis on the estuarine reefs.

The coordination of reefing vessels will continue through the DMF, but likely to a lesser degree than this past grant duration. This grant duration saw the dissolving of a major artificial reef partner (a sport fishing club) and the economic climate has impacted the funding derived from fishing tournaments. The next five years, may however, see increases in donations from the diving community and fishing clubs interested in estuarine reefs may be interested in partnering with the reef program.

The next five years will see improvement in the permitting process, estuarine reef development, and improvement in angler satisfaction by creating more diverse fishing opportunities, improving access to information and angler awareness of the artificial reef system and its benefits.

Specific accomplishments for each of the last five years of the artificial reef coordination program are detailed below:

- **2005:** Coordination of construction activities occurred for the enhancement of seven (7) ocean and two (2) estuarine reef sites (Table 1). The coordinator's activities also included the supervision of buoying and monitoring the artificial reefs of North Carolina.

  The mandated fuel use restriction during September and October suspended a planned construction and buoy-servicing trip in the southern part of the State. This eliminated about four weeks of planned construction during the last quarter of 2005.

- **2006:** Coordination of construction activities occurred for the ten (10) ocean reef enhancement projects (Table 1). Coordination of reef enhancements projects scheduled for 2007 also occurred.

Presentations were given to seven (7) public groups of fishing, diving and civic interest reaching 198 persons through these venues.

- **2007:** Coordination of construction activities occurred for the six (6) ocean reef enhancement projects (Table 1). These projects included dock panels and concrete pipe available from post use and manufacturing defects. Coordination for seven (7) specific reef enhancements projects scheduled for 2008 and 2009 also occurred.

  Presentations were given to nine (9) public groups of fishing, diving, civic interest, and government.

- **2008:** Coordination of construction activities occurred for the six (6) ocean reef enhancement projects (Table 1). The coordinator's activities included the supervision of buoying and monitoring the artificial reefs of North Carolina.

  Presentations were given to four (4) groups of fishing, diving, and civic interest.

- **2009:** Coordination of construction activities occurred for the one (1) ocean reef enhancement projects (Table 1). A permitting application was submitted for on (1) estuarine reef enhancement project.

  The Artificial Reef Coordinator was on extended medical leave for 8 ½ months. Coordination activities were accomplished by other Division employees during this time.

  Utilizing the NC DMF web page and multi-media presentations the Artificial Reef Coordinator disseminated artificial reef information to the public and maintained communication with other State's reef programs. In June 2009, the Artificial Reef Guide web page was updated with the latest additions including vessels previously without a known GPS location. The web site is located at: http://www.ncdmf.net/reefs/index.html. The web site includes a material description, date of deployments and latitude/longitude in Degrees and Decimal Minutes (DDM) for GPS locations. The artificial reef program staff gave presentations to a fishing club (1), a government organization (1), and at a public meeting (1) on a new site placement.

Table 1. Coordinated artificial reef deployments

Artificial Reef Deployments 2005			
Artificial Reef #	Description	Material	Quantity
AR-145	No Name	USCG HU-25-QA Falcon airplane	54 ft.
AR-250	No Name	Concrete box sections	300 tons
AR-275	Bill Smith Reef	AR-Assorted scrap concrete and concrete mixer drums	
AR-345	Swansboro Rotary Club	Manholes and Reef Balls	20 units each
AR-345	Swansboro Rotary Club	Manholes bases	20 units
AR-420	Tom McGlammery Reef	Misc. concrete items	87 pieces
AR-420	Tom McGlammery Reef	Misc. concrete items	88 pieces
AR-420	Tom McGlammery Reef	Misc. concrete items	90 pieces
AR-420	Tom McGlammery Reef	Concrete mixing drums (3), concrete pipe	135 pieces (pipe)
AR-420	Tom McGlammery Reef	Misc. concrete items	89 pieces
AR-420	Tom McGlammery Reef	24” Concrete pipe	170 pieces
AR-420	Tom McGlammery Reef	24” concrete pipe	159 pieces
AR-425	Yaupon Beach Reef	Reef Balls	100 balls
AR-460	Fisherman’s Reef	Assorted manhole sections	180 tons
AR-460	Fisherman’s Reef	Assorted manhole sections	180 tons
AR-465	Gary Ennis Reef	Reinforced Concrete Pipe	800+ ton

Artificial Reef Deployments 2006			
Artificial Reef #	Description	Material	Quantity
AR-145	No Name	2nd USCG HU-25-QA Falcon airplane	54 ft.
AR-250	No Name	Concrete box sections	150 tons
AR-320	Cliffton Moss Reef	Concrete manhole sections	75 tons, 33 units
AR-340	J. Paul Tyndall Reef	Concrete manhole sections	130 tons, 43 units
AR-360	Topsail Reef	Reef Balls	23
AR-342	Onslow Bay Sport Fishing Club Reef	Concrete manhole sections	78 pieces
AR-345	Swansboro Rotary Club	Concrete pipe, DOT Scrap	150 tons each
AR-378	Phillip Wolfe Reef	Concrete pipe	85 pieces
AR-378	Phillip Wolfe Reef	Assorted concrete pipe, pilings and headers	114 pieces
AR-425	Yaupon Beach Reef	Concrete pipe and dock panels	325 pieces
AR-425	Yaupon Beach Reef	Concrete dock panels and headers	65 pieces
AR-425	Yaupon Beach Reef	Concrete dock panels and headers	65 pieces
AR-425	Yaupon Beach Reef	Scrap dock panels	Approx. 120 tons
AR-440	Brunswick County Fishing Club Reef	Concrete pipe, various sizes	130 pieces
AR-440	Brunswick County Fishing Club Reef	Concrete pipe, various sizes	219 pieces
AR-440	Brunswick County Fishing Club Reef	Assorted concrete items	150 tons
AR-460	Fisherman’s Reef	Concrete pipe various sizes	75 pieces
AR-460	Fisherman’s Reef	Concrete pipe various sizes	75 pieces
AR-460	Fisherman’s Reef	Concrete pipe various sizes	108 pieces
AR-460	Fisherman’s Reef	Concrete pipe various sizes	108 pieces
AR-460	Fisherman’s Reef	Assorted concrete items	150 tons

Artificial Reef Deployments 2007			
Artificial Reef #	Description	Material	Quantity
AR-275	Bill Smith Reef	Concrete pipe	179 tons
AR-285	George Summerlin Reef	Manhole sections and risers	180 tons, 80 pieces
AR-315	Atlantic Beach Reef	Assorted concrete pipe and dock headers	150 tons, 90 pieces
AR-315	Atlantic Beach Reef	Assorted manhole boxes & risers	150 tons, 74 pieces
AR-340	J. Paul Tyndall Reef	Assorted panels and headers	67 pieces
AR-340	J. Paul Tyndall Reef	Assorted dock and roof panels	67 pieces
AR-340	J. Paul Tyndall Reef	Assorted dock panels and pipe	50 pieces
AR-342	Onslow Bay Sport Fishing Club Reef	Concrete cones, risers, and bases	75 pieces
AR-342	Onslow Bay Sport Fishing Club Reef	Assorted concrete items	55 pieces
AR-342	Onslow Bay Sport Fishing Club Reef	Concrete pipe	158 tons
AR-342	Onslow Bay Sport Fishing Club Reef	Concrete pipe	118 pieces
AR-342	Onslow Bay Sport Fishing Club Reef	Concrete pipe	125 pieces
AR-342	Onslow Bay Sport Fishing Club Reef	Concrete pipe	125 pieces
AR-342	Onslow Bay Sport Fishing Club Reef	Concrete pipe	128 pieces

Artificial Reef Deployments 2008			
Artificial Reef #	Description	Material	Quantity
AR-315	Atlantic Beach Reef	Concrete pipe	157 tons
AR-315	Atlantic Beach Reef	Concrete pipe	160 tons
AR-315	Atlantic Beach Reef	Concrete pipe	162 tons
AR-315	Atlantic Beach Reef	Concrete pipe	161 tons
AR-370	Meares Harris reef	Concrete pipe	155 tons
AR-378	Phillip Wolfe Reef	Misc, concrete items	115 tons
AR-378	Phillip Wolfe Reef	Concrete pipe	138 pieces
AR-400	Robert “Bob” Black Tower Reef	Vessel Capt. Greg MicKey	180 ft
AR-420	Tom McGlammery Reef	Assorted pipe and concrete items	154 tons
AR-420	Tom McGlammery Reef	Concrete manhole bases	155 tons
AR-445	Dale McDowell Reef	Concrete pipe	155 tons
AR-445	Dale McDowell Reef	Concrete pipe	155 tons
AR-445	Dale McDowell Reef	Concrete pipe	155 tons
AR-445	Dale McDowell Reef	Concrete pipe	155 tons
AR-445	Dale McDowell Reef	Concrete pipe	155 tons
AR-455	Dale Ward Reef	Concrete pipe	154 tons
AR-455	Dale Ward Reef	Concrete pipe and manhole sections	156 tons
AR-455	Dale Ward Reef	Concrete pipe	175 tons
AR-455	Dale Ward Reef	Concrete pipe	160 tons

Artificial Reef Deployments 2009			
Artificial Reef #	Description	Material	Quantity
AR-330	Howard Chapin Reef	Steel Sailboat, Nepomuk	50 ft.

Year	Artificial Reef	Description	Material	Quantity
2005	AR-465		reinforced concrete pipe	800+ tons
	AR-145		USCG Falcon jet	
2006				
	AR-145		USCG Falcon jet	
	AR-378		Reinforced concrete pipe	
2007	AR-400	Bob Black Tower Reef	Steel boat, M/V Coastal Mariner "Capt. Greg MicKey"	180 ft.
2008	AR-315	Atlantic Beach	reinforced concrete pipe	588.6 tons
	AR-370	Meares Harris	reinforced concrete pipe	154.2 tons
	AR-378	Phillip Wolfe	reinforced concrete pipe misc. manhole sections	154.4 tons 61.8 tons
	AR-420	Tom McGlammery	misc. manhole sections	346.1 tons
	AR-445	Dale McDowell	reinforced concrete pipe	764.7 tons
	AR-455	Dale Ward	Reinforced concrete pipe	762.6 tons
2009	AR-330	Howard Chapin Reef	Steel Sailboat, Nepomuk	50 ft.